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regards.*

HAS THE INTELLECT A FUNCTION ?

*A lecture given at the institute of pathology,
St. Mary's Hospital, on June 20.*

BY

WILFRED TROTTER, M.S. LOND., F.R.S.

CONSULTING SURGEON TO UNIVERSITY COLLEGE HOSPITAL, LONDON

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HAS THE INTELLECT A FUNCTION?

THERE is no aspiration more commonly expressed by conscientious teachers than that they should be able to give their pupils the power to think for themselves. This ambition seems so innocent and laudable that we are apt to let it pass without examining its merits as a practical proposition. If we do look at it closely in that light we cannot fail to notice certain unexpected features about it. One is that those who propose to confer this great gift of free thought often manifest but little of that activity themselves. A second is that when a pupil does by chance show some evidence of individual thinking the teacher himself is apt to seem a little disconcerted; but perhaps the oddest thing that is noticeable in these good intentions is a reticence about how they are to be carried out. Pupils are to be taught to think for themselves but how it is to be done is withheld from us.

I have produced this little problem merely as an introductory note. Before passing on however we may extract from it a more general reference. We have before us the assumption that the exercise of thinking—and especially of independent thinking—is beyond all question good and desirable. But we also find that this approval is not in practice so wholly unqualified as seems at first to appear. I have called to mind the fact that in the rare case of a pupil developing independence of thought even the teacher is apt to show as a little taken aback. We have the hint, then, that our general applause for thinking is not without an eye on what is thought; that when we urge the young to think for themselves we are inclined to be disappointed if they do not think like us. At the climax of "Mansfield Park" we become aware of some anxiety lest the amiable inertia of Lady Bertram should prevent her reacting to the elopement of her married daughter with the proper indignation. We are reassured however by this remark of the author: "Lady Bertram did not think deeply but, guided by Sir Thomas, she thought justly on all important points." It is to be feared that when we desire our pupils to think for themselves our anxiety is not so much that they should think deeply as that they should think justly on all important points.

THE PROBLEM ITSELF

These trivial preliminary reflections serve to bring us without undue abruptness into the presence of our actual problem, which is the behaviour of the faculty of reason in man. Without pausing here to fidget with definitions it is necessary to say that I use this expression—faculty of reason—which is now so old-fashioned as to be practically out of work, to denote in a broad rough way the capacities in which man differs from the other animals. Now the faculty of reason in one aspect may be said to be the indispensable agent in everything man has accomplished. It enables him to learn, to add knowledge to knowledge and preserve it, to build up arts, sciences, and civilisations without limit. Yet, in another aspect, this same implement can as it were turn in his hand and become the enemy of all constructive activities. With its Ptolemaic systems, caloric fluids and phlogiston theories, reason has been deleterious enough even in the quiet fields of science. It taught astronomers that planetary orbits are circular because the circle is the perfect curve; it proved that the number of planets could be no more than seven and enabled Hegel to deride the none the less successful search for an eighth by Adams and Le Verrier; and even today it probably exercises over free experiment a quiet censorship far stronger than most of us would like to admit.

The history of medicine teaches us that when reason took a hand *there* it was not only truth that suffered. The rational system of a Stahl, a Brown, a Rush or a Broussais unfortunately did not exist in a mere metaphysical vacuum but at the bedside—and armed with opium, antimony, alcohol, mercury, the lancet and the purge. Thus the consequences of the confident use of reason in medicine have been gloomy enough. When the same implement has been applied to the general affairs of life the results have been even more dreadful. Few proscriptions, persecutions and massacres but have had their reasoned and logical justification. The various systems of doctrine that have held dominion over man have been demonstrated to be true beyond all question by rationalists of such power—to name only the greatest—as Aquinas and Calvin and Hegel and Marx. Guided by these master hands the intellect has shown itself more deadly than cholera or bubonic plague and far more cruel. It is a strange fact that this pestilential virulence of reason has never fired the ambition of some great sanitarian of the mind. The incom-

patibility with one another of all the great systems of doctrine might surely have been expected to provoke some curiosity about their nature.

ACCEPTED SOLUTIONS

These few random instances should be enough to enforce what is after all a very old discovery. The things that come into the mind have a disarming air of obviousness and certainty. But it must have been known at a very early period that they are not to be taken for what they seem without some corrective test of their validity, and some other authentication than their own charm.

In the age-long struggle with this problem no solution has been found that has been able to make human reason a universally applicable and generally trustworthy implement. Nevertheless something has come out of the struggle. This has been the evolution of three methods of setting about the pursuit of knowledge. They are not sharply marked off from one another and tend a good deal to overlap the limits one may be tempted to define for them. They do however clearly differ in the aspect of their task on which each lays its chief emphasis. Of these three methods the first is that of the practical art, which is mainly directed to the preservation of knowledge; the second is that of the natural sciences, which is directed to the increase of verifiable knowledge; and the third is that of philosophy, which seeks the unification of knowledge. The objects then of these three attitudes towards experience—the rewards of man's struggle for intellectual discipline—are respectively to preserve, to verify, and to unite. What their success has been we may now inquire.

THE METHOD OF THE PRACTICAL ART

The method of the practical art is that of the carpenter, the farmer, the builder, the doctor; it has of course as such nothing to do with the plastic arts and the æsthetic, but it may well excite our reverence as perhaps embodying the fundamental intellectual discovery on which all civilisations have been built up. Its primary interests have always been the preservation and transmission of knowledge rather than its discovery. These characters have made it the nurse of civilisation at a time when a new discovery could survive only by being fixed in the tradition of an art. A practical art comes then in its very nature to be strongly conservative, reluctant

to accept the new, still more reluctant to give up the old; it will teach by precept and example of the master, by apprenticeship; it will embody its lore in traditional dogma and in rule of thumb. Its ideal of success will thus be fulfilled as much by a given course of conduct having been correctly carried out as by its object having been attained. If he knows that he has proceeded *secundum artem* the practitioner will not be greatly distressed by a mere lack of success; and will readily blame the weather for the failure of his crop, the materials for the collapse of his building and his patients' constitutions for their diseases.

The extended reasoning process has little function in the practical arts. If allowed to enter them it finds itself in an environment possessing no indigenous methods of controlling it and is apt to develop a harmful exuberance. Nothing could illustrate this principle better than the speculative systems that devastated the medicine of the eighteenth and early nineteenth centuries in the way I have already referred to. To maintain its health a practical art must be sparing of theory and keep closely in contact with facts. It has no method of discovery other than that of almost purely random trial and error; it has no characteristic method of proof and can assimilate truth only when the prestige of its discoverer is great. For example Steinhäuser might discover in 1840, and Hughes Bennett proclaim, that cod-liver oil cures rickets, but this enormously important fact remained unproved and no more than a not very respectable pious opinion for the next 80 years.

THE METHOD OF THE NATURAL SCIENCES

The second of what I have called the three methods of setting about the pursuit of knowledge is that of the natural sciences. We need not attempt a complete definition of natural science and if we were to try we should find that its margins tend to grow indistinct as we concentrate on them. A perfectly adequate practical definition is the statement that its central function is to acquire verifiable knowledge. A verifiable fact is one that has shown itself to have a relation to certain definable conditions such that wherever and whenever the conditions have been reproduced the fact in question has always accompanied them. Such verification is the characteristic and only sanction of science. Whether we like a given fact or not, and whether it seems

true or revolts our reason, are quite irrelevant to its scientific validity.

All knowledge comes from noticing resemblances and recurrences in the events that happen around us. Although some of us may be much quicker than others in the power of seeing and comparing, it is obvious that the greatest talent cannot carry us very far as long as observation and experiment are applied only to random experience. It is the discovery of natural science that experience can be simplified so that on the one hand resemblances and recurrences in events can be more easily seen, and on the other that the conditions in which they occur can be completely specified. This, using the term in the broadest sense, is the experimental method. In one aspect it may be regarded as a mere refinement of the rough and ready trial and error of the craftsman and the common man. In another aspect however the change is so great as to be virtually a qualitative one and to make the method distinct from all others. It is not necessary to dilate here on the power it has displayed in advancing knowledge or the huge acceleration it has imparted to that process. It is more relevant to note the limits to which its application is subject. The scientific method is unfitted to tackle directly the turbulent stream of everyday experience and common affairs ; it must run off minute fractions of it into carefully specified and engineered channels before it can bring its powers to bear. Thus for example the work of social government is not as such directly accessible to it on account of the jumbled miscellaneity of the matters involved.

In saying this I must guard myself against being thought to pronounce on a wholly different question which might be supposed to be similar. It is of course obvious that governments now existing fail to make use of much knowledge already established by science and capable of immediate application. Even however if this deplorable lag could be abolished, the direct application of scientific method to government itself as a whole would, with our present powers, be impossible.

After what has been to some extent a digression we pick up the line of our argument again when we ask ourselves what part in the scientific method is taken by what I have called the extended reasoning process. The history of science is generally supposed to furnish a wonderful display of the triumphs of human reason. I must confess that the reading of

it does not induce in me any such grandiose conception of the mind. The separate steps of progress have rarely been much prepared for by long flights of rational forecast. Great investigators seem mostly to have been led from fact to fact; to have depended on a kind of intuitive flair for the behaviour of their material; and to have used reasoning rather for the planning of their work and the design of experiments than for elaborate structures of argument.

Although rational and imaginative speculation is of the greatest general value to science in keeping it from going dry and orthodox, as an actual implement of research it has not very much to its credit. Experience has shown time and again that as soon as science leaves immediate contact with the facts it begins to lose direction and reality, and must constantly return to them for orientation. Great discoveries will therefore continue to be unexpected and the advance of science occur on an irregular front in which the salients mark the places where amongst the facts the going is good. Even research deliberately directed against short-range targets is apt to be held up contrary to all reasonable expectation or to score its successes through unintentional deflections. In the light of these considerations we may contemplate with benefit the bitter war of attrition that has marked the enormous and world-wide attack on cancer; or remember Rayleigh setting out to determine the atomic weight of nitrogen and coming up against argon, or Holst and Fröhlich setting out to study beriberi and finding the cause of scurvy. We thus seem to get the plain hint of a rather odd conclusion. It is that natural science—by far the most successful of man's inventions for setting about the pursuit of knowledge—has not been able to make any extended use of the directive faculty of reason. If we were to allow the sceptical spirit full liberty for a moment, we might find ourselves wondering whether the vast mass of scientific knowledge has not in some queer way invented itself—a suggestion that makes it seemly to change the subject.

THE METHOD OF PHILOSOPHY

The third method of setting about the pursuit of knowledge is that of philosophy. We may content ourselves here by defining philosophy no more closely than to say it has for its central object the search for unification or less summarily the effort to bring all knowledge whatever into a single consistent scheme.

We have perhaps been a little disconcerted at finding ourselves able at least to defend the view that the rational activities of the mind have played no overwhelming part in the practical arts or the natural sciences. We shall not have that fault—if it is a fault—to find with philosophy.

As far as history is able to tell us the deliberate use of rational thought as an implement of research was invented by the Greeks of classical times some 2500 years or more ago. It is difficult to think of now as a definite discovery and to call it such sounds like calling locomotion or digestion a discovery. Nevertheless it was a true discovery and produced a real deflection in the strange roads of human destiny. We can call a discovery great when it catches man unprepared, and we find in the history of many such the evidence of man's unpreparedness in the way he has tended to mix the use and misuse of these gifts. Rational thought in the pursuit of knowledge bears these marks of mixed use and misuse as plainly as do printing, gunpowder and the internal-combustion engine.

This new implement was to impel intellectual activity into a course it was to follow for two and a half millenia. We may therefore well ask ourselves what precisely was the device that could exercise so strong an influence. It was abstract thought. At that name of power we find ourselves at last compelled to devise an exact definition.

The discovery that was made by the Greek, and that we may fairly say intoxicated him, was that you can consider the qualities of things apart from the things themselves. You survey, let us suppose, a miscellaneous collection of objects, untidy and with no coherent meaning. Suddenly you notice that they possess in common some such quality as hardness or colour or weight, and that you can think of this as existing apart from the disorderly mess you are looking at. A new thing has appeared—an abstraction—having an existence of its own and superior to the accidents of the apparent world. You find that these abstractions are easy to think about. They are clear, shapely and can be depended on to stay where you put them. You can consider their relations to one another at your ease without being bothered by odd and “insignificant” individualities. No wonder its discoverers were enchanted by this method of introducing order and seamliness into the chaos of experience and that they exploited it to excess.

A good deal of mystery has been made of the fact that the Greeks, with all their curiosity and liveliness of mind, turned away so obstinately from the immediate study of nature. Even Aristotle was rather contemptuous of direct observation and experiment, and Plato says somewhere concerning the study of natural phenomena, "these things have no absolute first principle and can never be the objects of reason and true science." The mystery seems to me rather artificial. The Greeks despised the mere pedestrian grubbing among facts because they had discovered something superior to it. In the abstract world they had found a better kind of reality—orderly, clean, unaccidental, and capable of being successfully manipulated without soiling a gentleman's fingers or compromising his dignity.

It must be admitted fully that the abstract method is ineradicably entwined in all our thinking and is indispensable. This is however by no means to acquiesce in its universal dominance or to excuse the general failure to examine sceptically its nature and limitations.

The charm and the use of the method are that it permits us to take into our minds phenomena in their essence only, to examine them there and as it were acquire experience of them without being distracted by their mere individual oddities. The abstraction "space" thus comes to represent a certain common quality of innumerable experiences in the world of corners, surfaces, heights, depths and breadths. Vertebrate, amphibian, man are the well-behaved substitutes of countless creatures creeping, jumping, and running about the world in their odd unaccountable way. This process of abstracting what I have rather light-heartedly called the essence of phenomena, will be found to reward a rather closer attention and such attention may well be directed first to the simplest case of the process.

Remarkably little attention seems to have been given to the important fact that the only quality we know of which can be *completely* abstracted is number. Five digits in the mind are, as regards number, as good as five fingers of the hand. Every numerical experience of them and every such manifestation of them that is possible in the outer world can be initiated or repeated in the mind and with equal validity. The science of positive numbers is then the science which is at once perfectly abstract and perfectly experimental. The moment we leave number there begins to appear a decline in the exactitude

of the correspondence between the abstraction and the reality. For a long time it seemed that the qualities of space could also be completely abstracted because the conclusions derived from the abstract consideration of space seemed to be confirmed everywhere in the outer world even on the astronomical scale. Ultimately however it dawned on the geometers that there is a discrepancy between the abstraction and the reality. The need of an Einstein to point this out and the uproar that followed are perhaps a little surprising to mere common sense. What seems truly remarkable is not that intuitions derived from the stretch of the arms and the range of the eye should ultimately break down, but that their validity is so wide and their error so small.

When we apply the abstract method to events of the living world as we constantly do and must, we find ourselves faced by a great increase in the individuality of phenomena and should be prepared for a sudden drop in the representative value of all abstractions. The abstraction "man" must always be a thin, imperfect, and easily misleading summary of the innumerable individual "men." It is in the world of ideas however that the abstract makes its highest flights and develops to the full its fascinations and its dangers. Truth, justice, honour, beauty, being, right, wrong; I give a mere random list of abstractions from that world. These are no mere manageable equivalents designed for convenience of thought. They are creations which, made in all innocence, have taken on a life of their own and become the rulers of the mind. Could there be a more plausible and useful-looking conception than that of "truth"—a unitary principle that is to be the ultimate sanction at once of the statesman and the theologian, the man of science and the poet? Yet it is easy to make out that such a supposed unity can never be, and that behind its solemn frontage is a mere jumble of ideas. Nevertheless this bogus unit has notoriously had a strange power over man's mind and proved itself to be perhaps the most disastrous idol he has ever set up.

Abstraction of some degree is universal and inveterate in all kinds of thinking; in philosophic thinking however it is in addition characteristic and indispensable. The aim of philosophy is to unify all knowledge; it must therefore seek the generality it supposes to lie behind the multitudinous particulars of experience. In thus separating reality from its accidents it must depend on the abstract

method as its instrument and on reason as its sanction. Things will be true when they are pronounced true by the informed and enlightened intellect. The ultimate standard of philosophic truth is therefore an internal one; in the last resort such a truth is one that "feels true" to the philosopher. Philosophy has been cultivated by many, perhaps even most of the ablest minds the human race has produced. It has evolved innumerable systems of doctrine, each rationally proved by its founder to be true, and all inconsistent with one another. No enterprise has ever been longer or better pursued than the effort to find a body of philosophic doctrine which should compel the universal assent of rational minds. An experiment that has gone on failing for two and a half millennia may well make us wonder whether the apparatus is adequate or the method sound.

SCIENCE AND PHILOSOPHY IN CONTRAST

The rough definitions I have tried to make of the scientific and philosophic methods should now permit us to bring the two into useful comparison with one another. Before doing so however it is necessary to have clearly in mind that in practice the two procedures are by no means always kept distinct. Many a supposedly scientific opinion gets itself supported on purely rational grounds, and many a philosophic conclusion affects to depend on verification. We are concerned here with the characteristic quality of the two methods, and the fact that in actual use they are often confused only adds to the need for clear definition. Philosophy then desires its conclusions to feel true, science that they should come true; philosophy needs certitude, science needs verification. Science has no certitudes because its conclusions are based not at all on internal conviction but wholly on the regularities of observed experience.

It seems at first sight a very hard saying that science has no certitudes. In face of it we may expect to be reminded that the precision and trustworthiness of science are its very essence. These are undoubtedly among its most attractive characters, but they do not depend on the complete inner conviction of truth that alone gives the sense of certitude. Science makes great use of reason in its special way; it often appeals to the rationality of its conclusions in confirmation of them; and most of its conclusions do in fact come ultimately to seem profoundly reasonable. Nevertheless it does not possess, and should

not claim to be based on, a fundamental rationality ; the conception that the order or rationality of the universe tallies with the order or rationality of the best human minds, while it is for philosophy a vital necessity, is for science no more than a useful working hypothesis and therefore the servant rather than the master of research. Expositors of science however have unfortunately sometimes tended to drift into the philosophic mood. On such occasions they are apt to tell us of the august and inflexible uniformities of nature, the iron laws of cause and effect, the inevitable certainties of science and similar rationalistic dreams. If we examine science more realistically we shall find that its two most impressive aspects are first its detailed trustworthiness in practice, and secondly its *provisional quality*. It is in this second and rather unobtrusive character that the essence of natural science is revealed. The man of science within his own, often narrow, department can cheerfully regard all his knowledge as provisional only, and indefinitely liable to subversion by further inquiry. He gives us our only hope that some day the human spirit may learn to distrust all certitude, and live bravely in its own right and its own strength.

While it is to be insisted on that rationality is not the ultimate test of scientific truth, there is no reason to question the value of the rational process as an implement of research. It is however an implement of which no finding can be regarded as valid until it has found verification in experience. Whatever flights of reasoning science may take it must ever be returning to the facts for reassurance. Even in the most extended feats of pioneering in the light of theory—as for example we see in some degree in the evolution of the thermionic valve—there must be this repeated verification of actual experiment. The wings given to science by reason must be used like those of the ostrich rather than like those of the eagle, and help it along without raising it from the solid earth.

Philosophy on the other hand is characteristically free from these scruples about the validity of the most extended processes of reasoning. It insists of course that reason must be correctly used, but with this restriction, inflexibly maintains its ultimate validity. I need not repeat the pessimistic conclusion we have been compelled to draw from the failure of philosophy to yield any single dominating system of doctrine. But it is necessary to notice

the even more formidable attack on the ultimate validity of reason made by modern psychology. To the rationalist the intellect presents itself as a perfect instrument; if its material is prepared for it by competent logic, precise definition and a proper awareness of the difficult relations between language and meaning, then its operations must be carried on with frictionless integrity and its conclusions possess irresistible force. I have expressed this view in its extreme and perhaps least credible aspect. Other forms of it, less frank but far more insidious, are so nearly general in us all, that it should be described quite brutally as a complete delusion. To the eye of the psychologist the intellect has shown itself to be after all no more than a human organ, with preferences and caprices like the stomach and the kidney. Every structure of argument it builds, however massive and symmetrical it may look, rests on foundations from which it has no means of excluding disturbance by bias and preconception. Under the attack of this kind of knowledge there can be no doubt that sooner or later the supposed independent validity of reason must go down.

THE INTELLECT IN DAILY LIFE

We set out on this inquiry with the innocent and laudable idea that people should be able to think for themselves. It has already led us rather far so that before allowing ourselves to be still more deeply involved we may well ask what is to be the function of this admittedly desirable independent thinking. It is to enable us to contemplate usefully our current experience, and to develop opinions on social, political, and national situations without being entirely directed by custom and by prejudice. Now it is characteristic of the experience of daily life that it comes before us as a miscellaneous jumble of elements of which the mixture is irreducible. It must therefore be obvious that the scientific method cannot be directly applied to it since that method demands complete specification of its situations so that they may be subject to direct observation or controlled experiment. It is necessary here to guard ourselves from thinking that the practice of the scientific method enlarges the powers of the mind. Nothing is more flatly contradicted by experience than the belief that a man, distinguished in one or even several departments of science, is more likely to think sensibly about ordinary affairs than anyone else. The philosophic method on the other hand is no more useful

for direct application in daily life than is the scientific. Its rationalism and its confident faith in abstraction would in themselves disqualify it as a guide in the real world. In judging its capacity for this part however we are in a stronger position than we are with regard to science. The scientific method has never been tried in public affairs; the philosophic method has been tried with a persistence and self-devotion worthy of the higher insects. Utilitarianism, Hegelianism, dialectical materialism, totalitarianism are all characteristic products of the philosophic method; however rational and self-consistent they may be, they do not seem very helpful in causing people to think for themselves.

Our search for a method that shall assist the useful contemplation of daily experience has thus had a totally negative result. The common tendency to regard destructive criticism as always easy and generally reprehensible is one that I do not share; indeed I doubt if it could be acquiesced in by any sensible person making a frank survey of the intellectual world of today. We cannot but be struck by the remarkable prevalence of systems of doctrine, by their loudness, their confusion, and their deleterious effect on conduct. In all these systems the most indulgent examination will find little evidence of really enterprising thought, but it will find a great deal of reconditioned lumber, at its best of a low order of reality and now used to justify the lazier, the uglier and the baser inclinations of the human spirit. At no time in the history of the intellect has the sanitary work of destructive criticism been more needful.

CORRECTION OF THOUGHT

Although one might be reluctant to accept the orthodox view that destruction is justified only as a preliminary to rebuilding, we can all agree that the one is an excellent preparation for the other. If we have learnt to distrust the validity of the operations of the intellect, we at least have gained the advantage of looking at its proceedings with a new objectivity. If we have been expelled from our rationalistic paradise, at least the world is all before us where to choose.

To throw the helve after the hatchet is proverbially the temptation to which disappointment exposes us. It is not surprising therefore that we are sometimes advised, by what seems to be a growing body of opinion, actually to abandon the use of reason.

This advice is, I suspect, more often founded on a dislike for the conclusions of reason than on any radical doubt of their validity. We possess in reason an instrument that is powerful but admittedly very awkward to handle, and apt to pinch our fingers or jump back on our shins. It seems more sensible and less pusillanimous to learn how to use it rather than to throw it away. On attempts to make the intellect a practical and handy implement a truly enormous amount of very difficult work has been done. It is almost impossible to overstate the power and the ingenuity that have been given to the study of logic and to the relations of language and meaning. What little I know of these prodigies I regard with awe, but with an uneasiness that, in spite of the best will in the world, remains incurable. Each seems to promise that with a little more polishing, a screw tightened here and a nut adjusted there, the intellect will at last have been made the perfect instrument. If however, as I have tried to indicate, the whole instrument is subject to fundamental and incurable deflections, its operations cannot be rectified by the mere detailed adjustment of its inner machinery. Indeed the perfection of its inner mechanism may even exaggerate its total error, for no-one is more commonly impenetrable to ideas than the master of dialectic.

For a good deal longer than 2000 years the ablest men of every age have been fidgeting with the mechanism of the intellect in the hope of helping mankind to think and therefore behave reasonably. The state of the world today cannot but suggest that if practical thought is to become strong enough to help in saving our social systems from their increasing confusions, some more radical corrective is necessary.

The correction of instrumental errors is a familiar idea in practical science. The maker, having turned out as perfect an instrument as he knows how, studies the quality of its performance. Any error now found is to be dealt with not by tinkering with the machine but by having the constancy and amount of it carefully estimated and stated in a form that can be applied to the results. It is this method that forces itself upon us in determining the function of the intellect and rendering it fully available. Psychology has told us a great deal about the working of the mind and in an incidental way about its liabilities to error; but it has not systematically undertaken just this special practical task of, as it were, calibrating the intellect for the contemplation of ordinary experience. Unless such a work can be

done it seems probable that the ominous fatuity and confusion that mark our social and political affairs must continue to increase.

We have defined our problem and indicated the direction in which its solution seems to lie. The end of so long an argument is no place to examine in detail the ways in which this solution is to be applied. It would however be too gross a failure in enterprise if I were not to set out in plain terms a few crude examples of such application which we can all put to use.

In the first place we must get rid of the disastrous belief that there is any activity of the mind corresponding with the conception of pure reason. The mind has no such function. All processes of reasoning, however abstract, are participated in and influenced by feeling. We cannot separate off the reasoning process as such and set it to work in an emotional vacuum. What we can do is to suspect the grosser cases of the effect of feeling and to make an appropriate correction. There are many emotional states of which the action may be so deeply masked that it is impossible to detect them at work by direct observation. Such for example are the influence of nationalism, religion, personal vanity and fear—of death, of cruelty, of humiliation. Do not let us nourish the delusion that we can catch these in action and cast them out. We can tame them a little—only perhaps to make them more insidious—but even in the most dispassioned train of reasoning they are apt to exercise a steady treacherous pressure.

There is probably no commoner error than that of supposing it to be possible by a direct effort and for the purpose of fair discussion to free the mind from preconception and prejudice about a given question. "Mind you I am looking at it without prejudice"; how often have all of us said that in such circumstances. It is always untrue. We should do well on these occasions to inquire closely by what precise mechanism this supernatural purgation has been effected.

We are accustomed to regard evidence as a very positive and objective thing, which we blandly pronounce conclusive or inadequate or what not in the appropriate circumstances. More reasonably science allows itself a certain amount of practical compromise and is willing for everyday purposes to accept quite a small amount of evidence for a phenomenon when it is consistent with its context. When, however, the context of a new phenomenon is thought to be incongruous, troubles are apt to arise,

and perfectly respectable evidence be rejected. The history of the discovery of argon and of X rays admirably illustrates this. On both those occasions the insidious category of "experimental error" was able to conceal the truth for long periods—in the case of argon for no less than 100 years. Even science then shows that in practice its famous "experimental evidence" is no infallible safeguard against preconception.

In regions where the relatively unemotional air of the laboratory does not prevail, the influence of feeling easily becomes strong enough to deprive even highly respectable bodies of evidence of any serious value. It is for example a curious fact that in the very full discussions of spiritualistic phenomena attention has been chiefly concentrated on the dissection of the evidence itself. To the psychologist it is meanwhile obvious that testimony, of however irreproachable an appearance, which has been collected in the atmosphere of a strong desire to believe, must as a whole be subject to such deductions that its evidential value practically vanishes.

The last I shall produce of these rather random examples of how we may set about the correction of the rational process concerns the reception of new ideas. We like to suppose ourselves easily receptive of the new and that we are so by virtue of a natural mechanism. Unfortunately this is the exact opposite of the truth. The mind likes a strange idea as little as the body likes a strange protein, and resists it with a similar energy. It would not perhaps be too fanciful to say that a new idea is the most quickly acting antigen known to science. If we watch ourselves honestly we shall often find that we have begun to argue against a new idea even before it has been completely stated. I have no doubt that that last sentence has already met with repudiation—and shown how quickly the defence mechanism gets to work.

